

### Features and Benefits

- Chopper stabilized amplifier stage
- Optimized for BDC motor applications
- New miniature package / thin, high reliability package
- Operation down to 3.5V
- CMOS for optimum stability, quality, and cost
- Ultra low  $I_{DD}$  current

### Applications

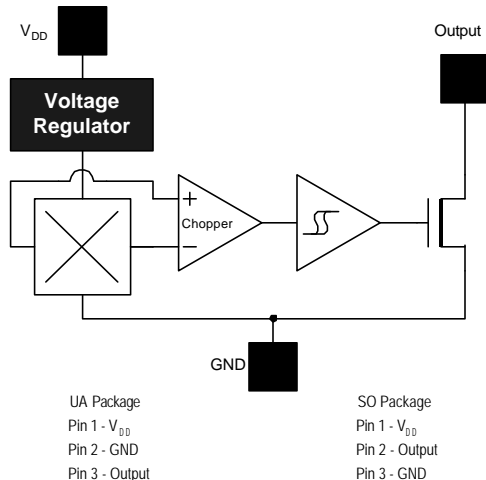
- Solid state switch
- Brushless DC motor commutation
- Speed sensing
- Linear position sensing
- Angular position sensing
- Current sensing

### Ordering Information

Part No.	Temperature Suffix	Package	Temperature Range
US2881 / US2882	E	SO or UA	-40°C to 85°C Extended
US2881 / US2882	L	SO or UA	-40°C to 150°C Full Temp.

\*Contact Factory or Sales Representative for Legacy Temperature Versions

### Functional Diagram



### Description

The design specifications and performance of the Melexis US2881 have been optimized for commutation applications in brushless DC motors and automotive speed sensing.

The output transistor will be latched on ( $B_{OP}$ ) in the presence of a sufficiently strong South pole magnetic field facing the marked side of the package. Similarly, the output will be latched off ( $B_{RP}$ ) in the presence of a North field. The SOT-23 device is reversed from the UA package. The SOT-23 output transistor will be latched on ( $B_{OP}$ ) in the presence of a sufficiently strong North pole magnetic field subjected to the marked face.

*Note: Static sensitive device; please observe ESD precautions. Reverse  $V_{DD}$  protection is not included. For reverse voltage protection, a 100  $\Omega$  resistor in series with  $V_{DD}$  is recommended.*

## US2881 and US2882 Electrical Specifications

DC operating parameters:  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 12V_{DC}$  (unless otherwise specified).

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage	$V_{DD}$	Operating	3.5		27	V
Supply Current	$I_{DD}$	$B < B_{OP}$	1.5	2.0	4.0	mA
Saturation Voltage	$V_{DS(on)}$	$I_{OUT} = 20\text{ mA}$ , $B > B_{OP}$		0.4	0.5	V
Output Leakage	$I_{OFF}$	$B < B_{RP}$ , $V_{OUT} = 27V$		0.01	5.0	$\mu\text{A}$
Output Rise Time	$t_r$	$V_{DD} = 12V$ , $R_L = 1.1\text{ k}\Omega$ , $C_L = 20\text{ pf}$		0.04		$\mu\text{s}$
Output Fall Time	$t_f$	$V_{DD} = 12V$ , $R_L = 1.1\text{ k}\Omega$ , $C_L = 20\text{ pf}$		0.18		$\mu\text{s}$

## US2881 Magnetic Specifications

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating Point	$B_{OP}$		0.5	2.0	4.5	mT
Release Point	$B_{RP}$		-4.5	-2.0	-0.5	mT
Hysteresis	$B_{hys}$		3.0	4.0	5.0	mT

## US2882 Magnetic Specification

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating Point	$B_{OP}$		-2.0	2.0	6.0	mT
Release Point	$B_{RP}$		-6.0	-2.0	2.0	mT
Hysteresis	$B_{hys}$		3.0	4.0	5.0	mT

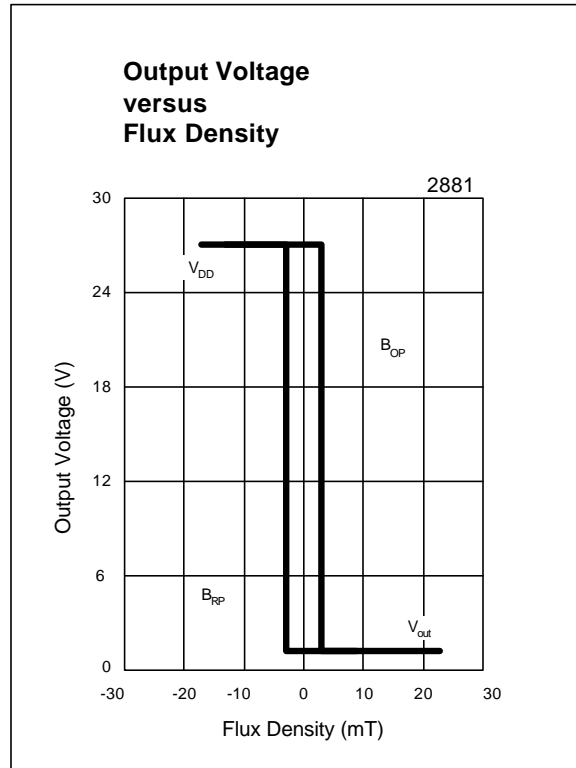
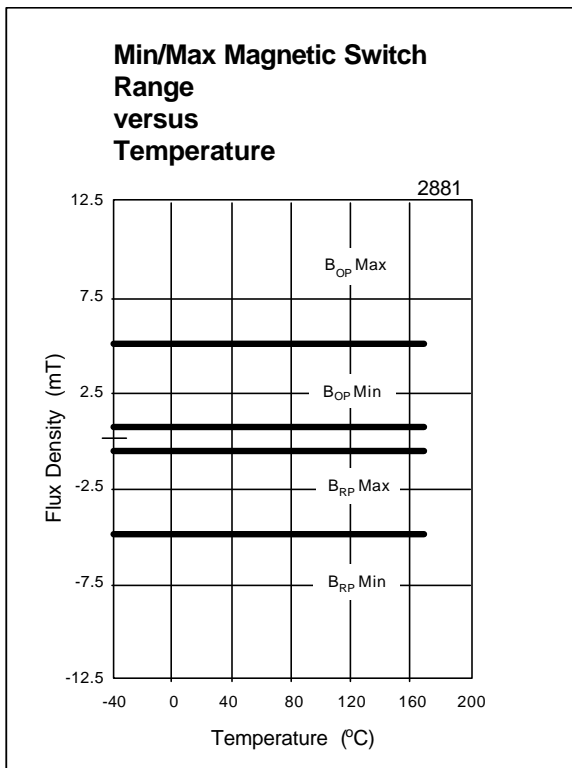
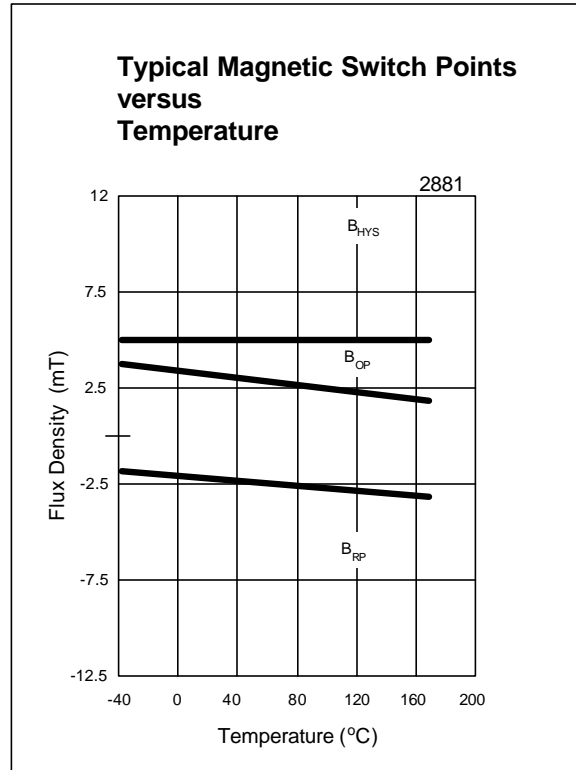
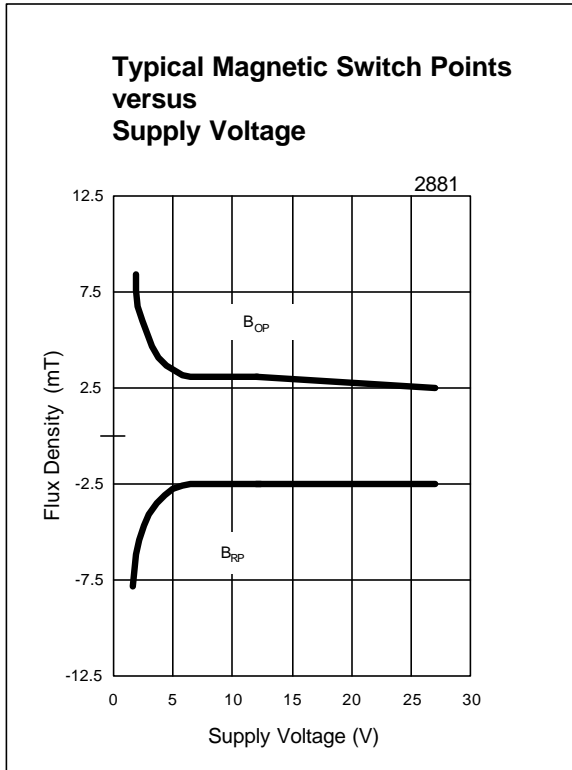
**Note:** 1 mT = 10 Gauss.

## Absolute Maximum Ratings

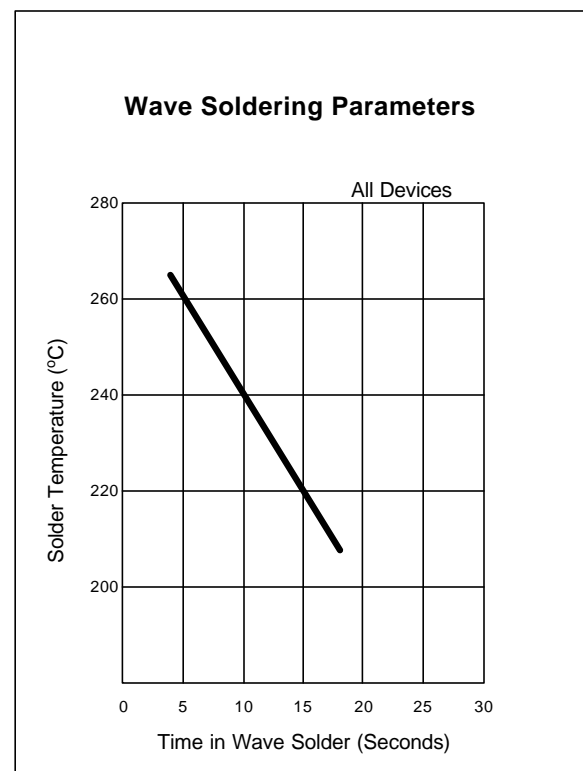
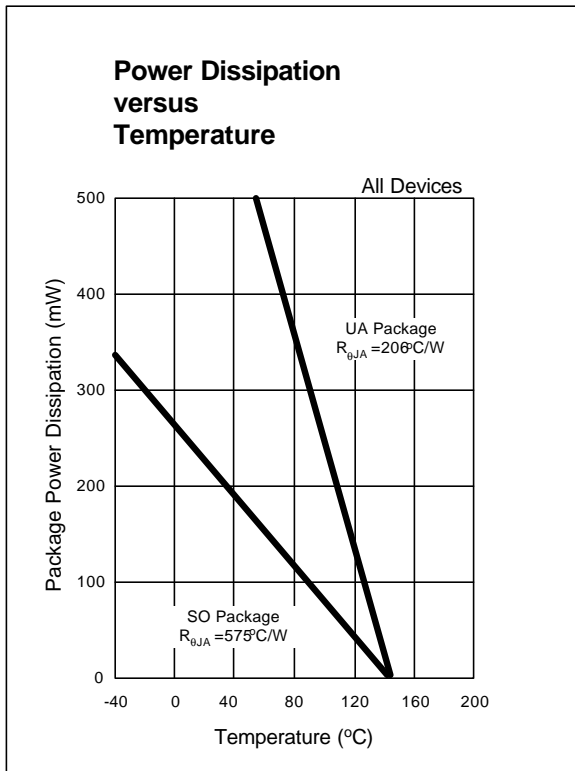
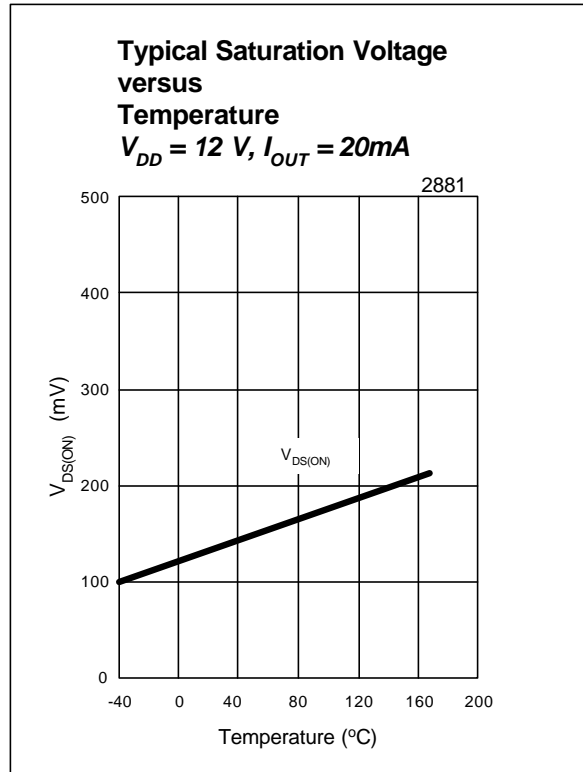
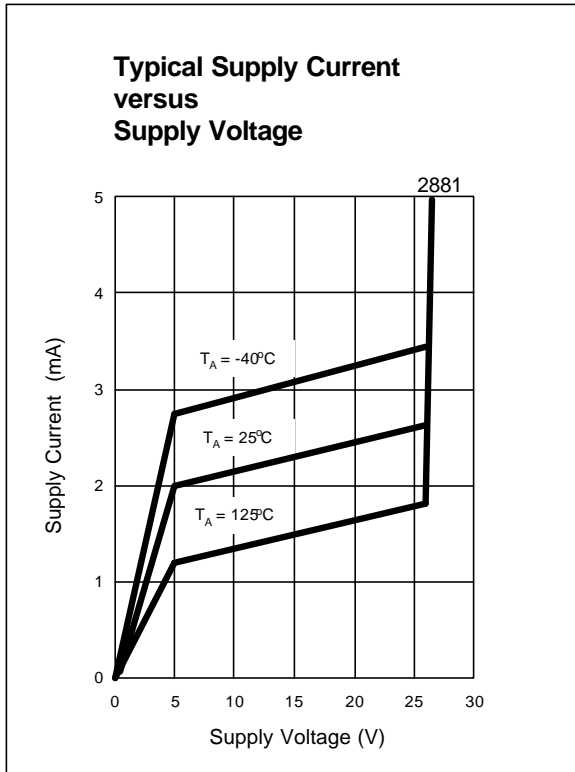
Supply Voltage (Operating), $V_{DD}$	24V
Supply Current (Fault), $I_{DD}$	50mA
Output Voltage, $V_{OUT}$	24V
Output Current (Fault), $I_{OUT}$	50mA
Power Dissipation, $P_D$	100mW
Operating Temperature Range, $T_A$	-40 to $150^\circ\text{C}$
Storage Temperature Range, $T_S$	-65 to $150^\circ\text{C}$
Maximum Junction Temp, $T_J$	$175^\circ\text{C}$
ESD Sensitivity (All Pins)	+/- 4KV

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## Performance Graphs



## Performance Graphs



### Unique Features

#### CMOS Hall IC Technology

The Chopper Stabilized Amplifier, using switched capacitor techniques, eliminates the amplifier offset voltage, which in bipolar devices is a major source of temperature sensitive drift. CMOS makes this advanced technique possible.

The CMOS chip is also much smaller than the Bipolar chip, allowing very sophisticated circuitry to be placed in less space. The small chip size also contributes to lower physical stress and less power consumption.

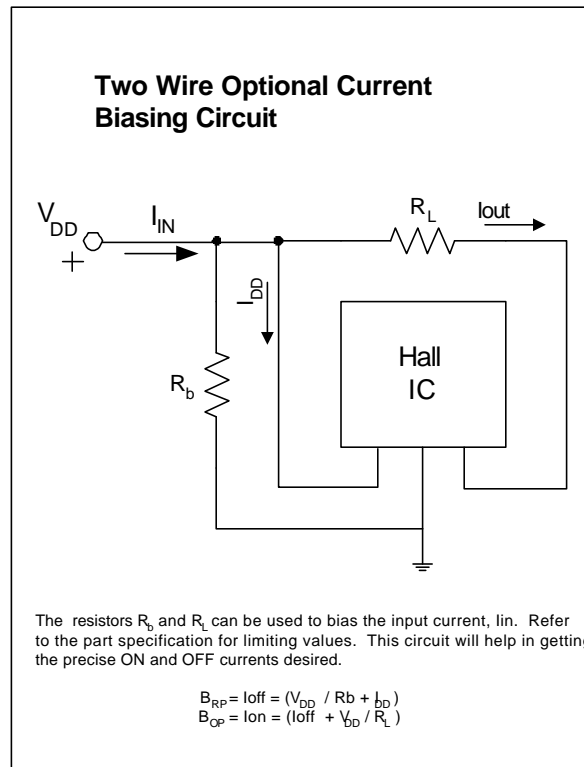
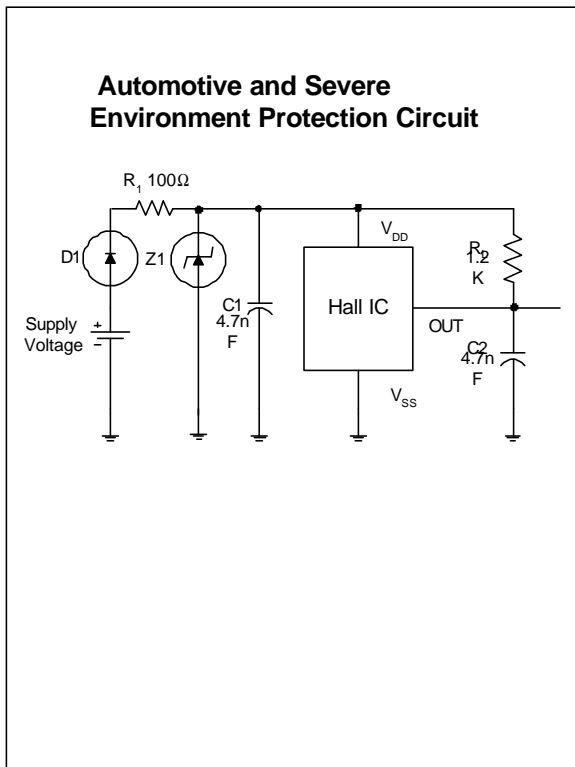
#### Installation

Consider temperature coefficients of Hall IC and magnetics, as well as air gap and life time variations. Observe temperature limits during wave soldering.

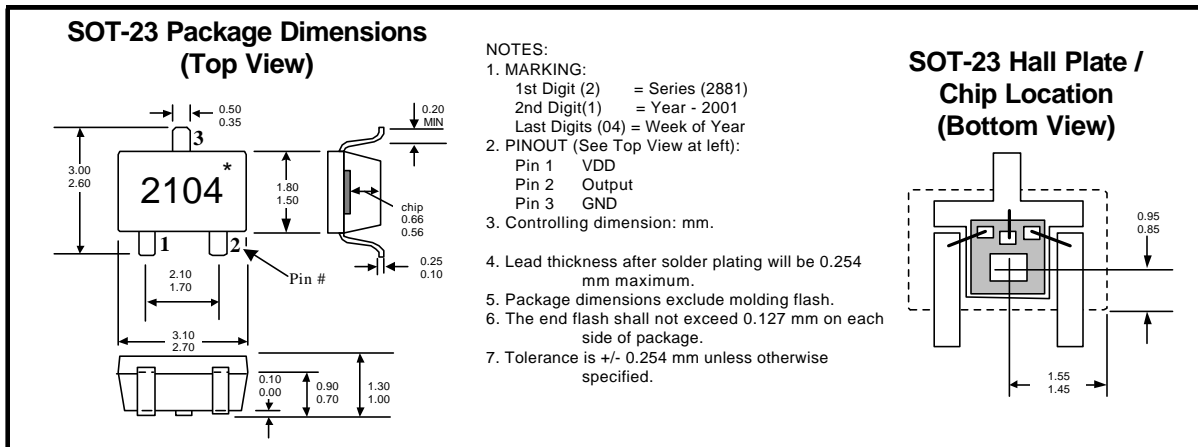
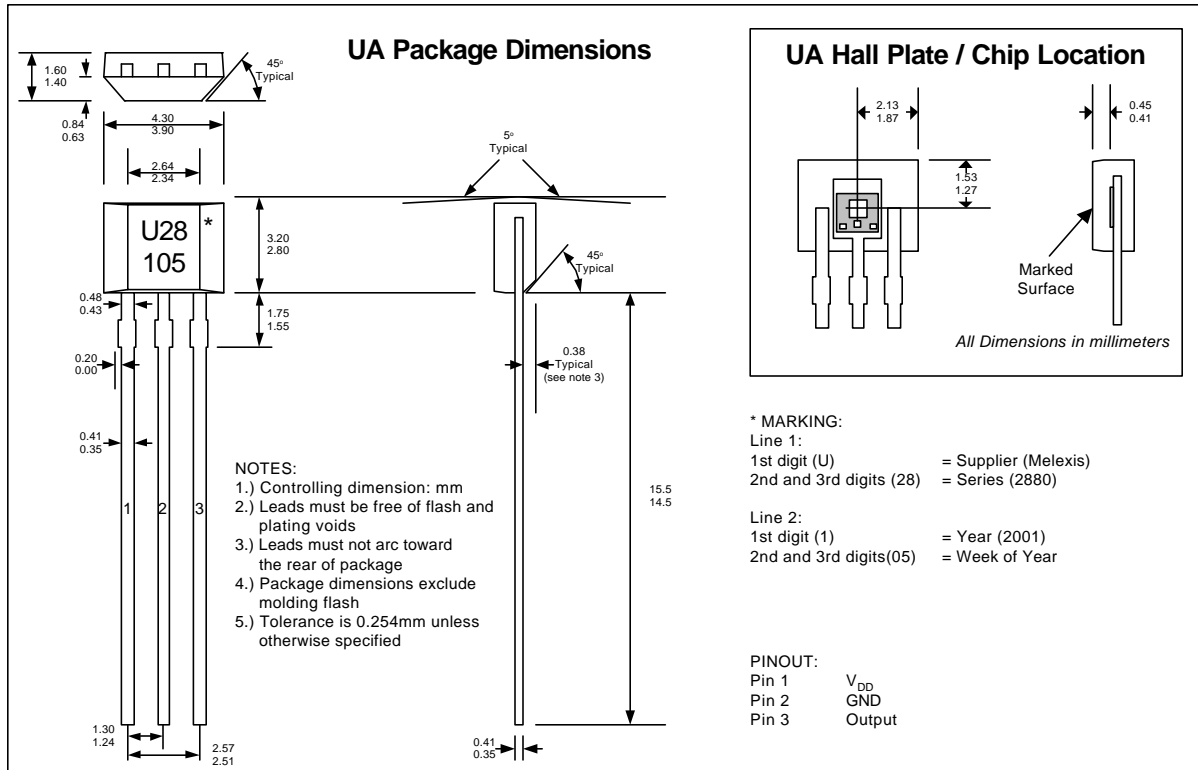
### Application Comments

If reverse supply protection is desired, use a resistor in series with the  $V_{DD}$  pin. The resistor will limit the Supply Current (Fault),  $I_{DD}$ , to 50mA. For severe EMC conditions, use the application circuit below.

### Applications Examples



## Physical Characteristics



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Go to our website at:

**WWW.melexis.com**

Or for additional information  
Contact Melexis Direct:

Europe and Japan

E-mail: sales\_europe@melexis.com

Phone: 011-32-13-670-780

USA and rest of the world

E-mail: sales\_usa@melexis.com

Phone: (603)-223-2362

**Revision History.**

Note: This page is intended to record changes, but not to be printed for distribution or conversion to a pdf.

<u>Revision</u>	<u>Date</u>	<u>By</u>	<u>Change</u>
5.5	9/28/00	rsa	On Page 2, changed units of measure for output rise / fall times from “ms” to “ $\mu$ s.”